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(54) **MINIATURE QUADRUPOLE MASS SPECTROMETER HAVING A COLD CATHODE IONIZATION SOURCE**

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(52) **U.S. Cl.** ..... **250/292**; 250/427; 250/423 R
(58) **Field of Search** ..... 250/427, 292, 250/423 F, 288, 287

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(57) **ABSTRACT**

An improved quadrupole mass spectrometer is described. The improvement lies in the substitution of the conventional hot filament electron source with a cold cathode field emitter array which in turn allows operating a small QMS at much high internal pressures then are currently achievable. By eliminating of the hot filament such problems as thermally "cracking" delicate analyte molecules, outgassing a "hot" filament, high power requirements, filament contamination by outgas species, and spurious em fields are avoid all together. In addition, the ability of produce FEAs using well-known and well developed photolithographic techniques, permits building a QMS having multiple redundancies of the ionization source at very low additional cost.

12 Claims, 8 Drawing Sheets